Productividad de las plantaciones en la Zona Centro de España

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Olive orchard productivity in the Central Area of Spain

- Central Area of Spain: climate, soil and varieties
- Productivity and quality

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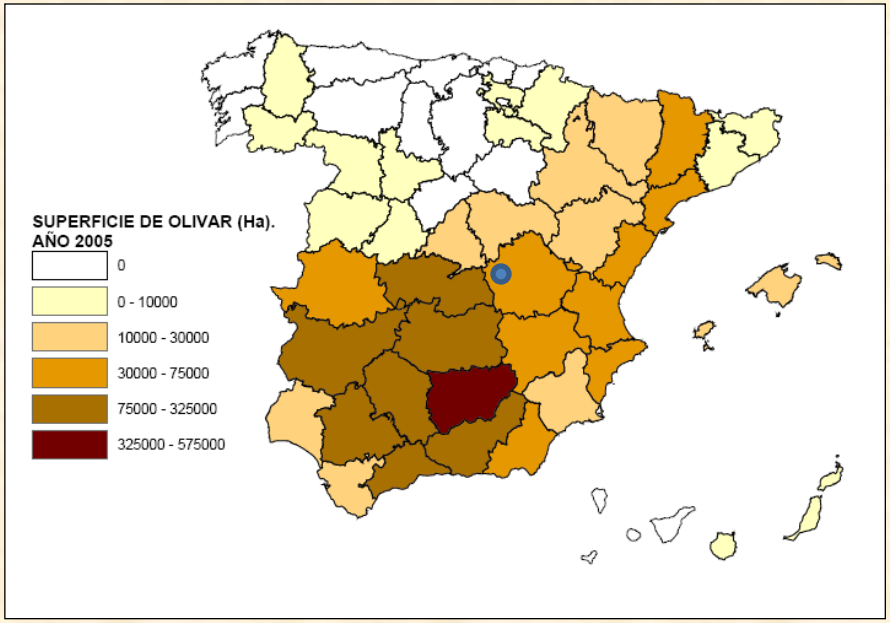
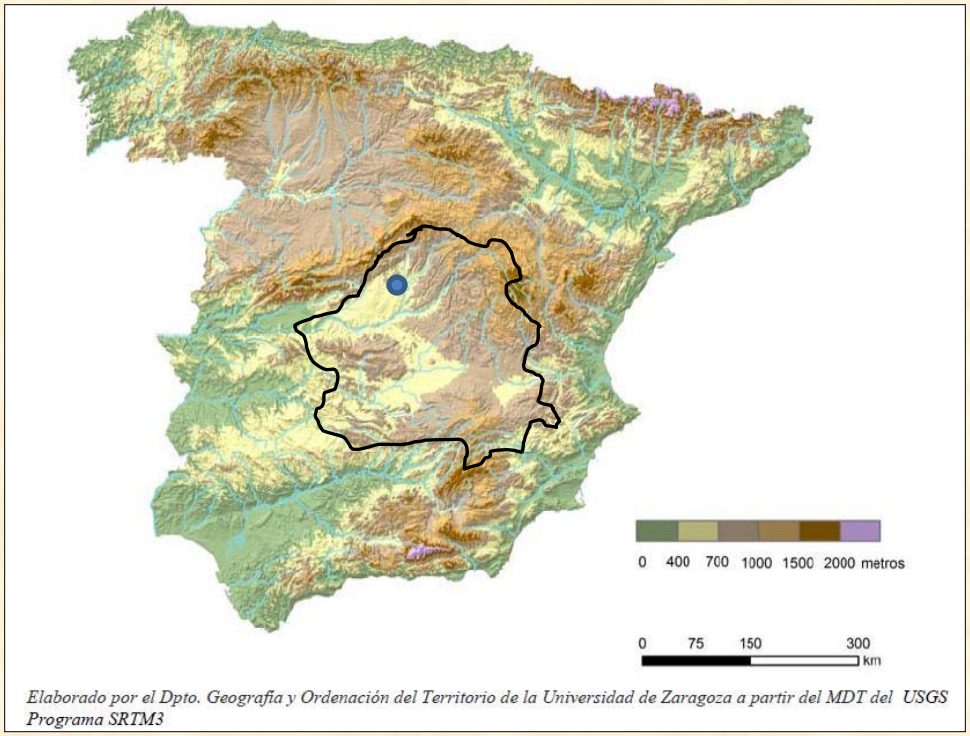
Central Area of Spain

Olive Central Area (Ministry of Agriculture, 1972)
15% total olive orchard in Spain (350.000 ha)
6% production (370.000 t)

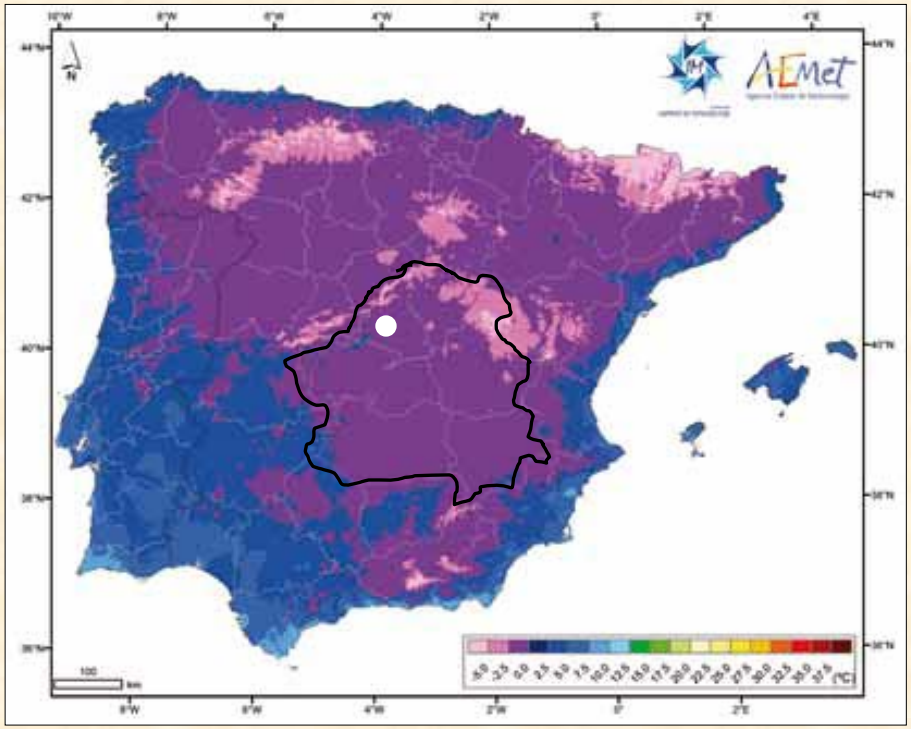


Central Area of Spain : climate

Latitude 38,5 – 41,5 ºN
High plateau > 400 m
Low temperatures. Average min January< 0 ºC



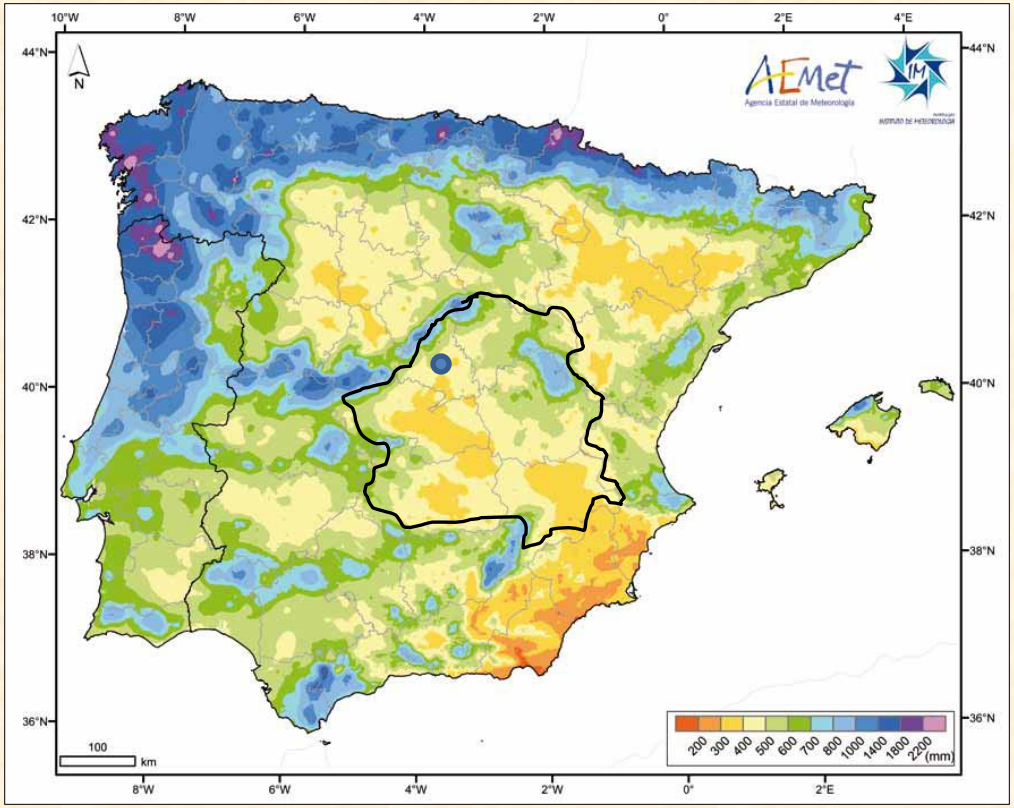
Topographic Map of Spain



Average of minimum temperatures January

Central Area of Spain : climate

Surrounded by mountains
Anual rainfall < 500 mm, ETo> >1300 mm
High cost of irrigation water



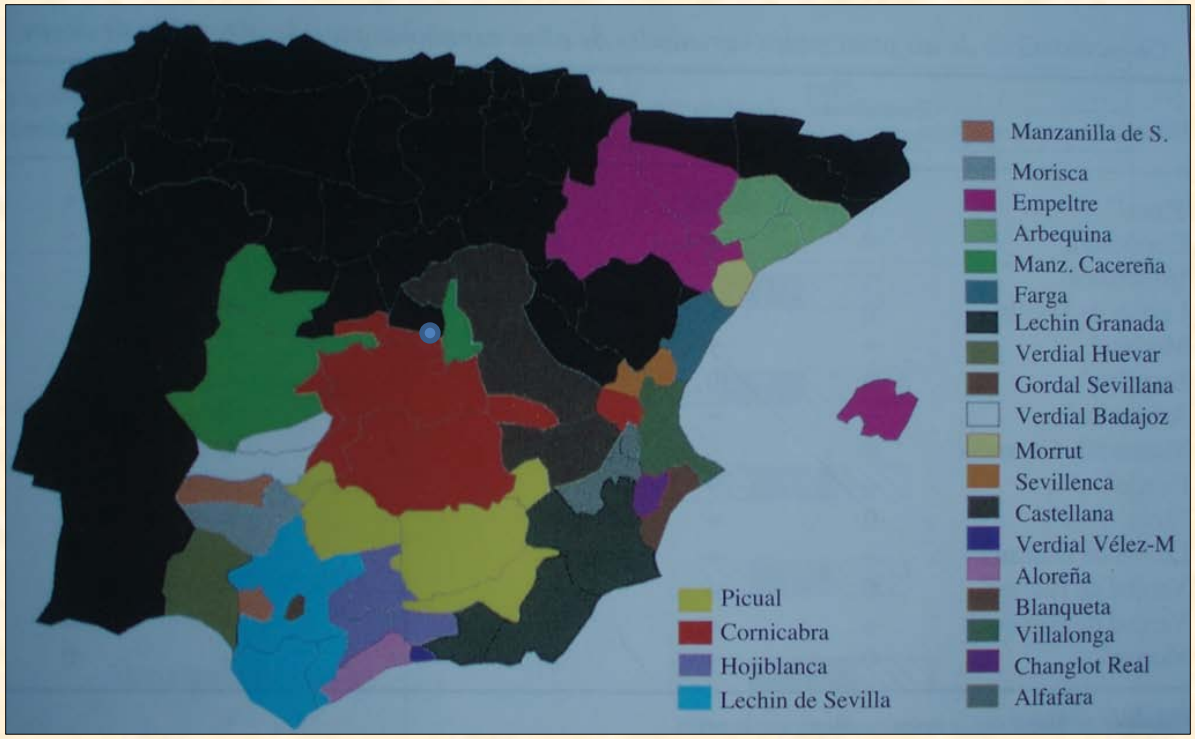
Annual rainfall

Central Area of Spain : climate and soil

Olives are grown in slopes
Shallow fertile soil

Central Area of Spain : variety

Cornicabra (270.000 ha)
Productive variety in cold areas, poor and dry soils
Oil with high oxidative stability
Sensitive to olive knot, alternate bearing and high FRF



Barranco (2008)

Central Area of Spain : productivity and quality

Orchard characteristics

- Few varieties: ‘Cornicabra’, ‘Arbequina’, ‘Picual’, ‘Manzanilla cacereña’… (Barranco et al., 2005)

- Low vigour: shorter growth season and scare water availability

- High orchard density

Cautions

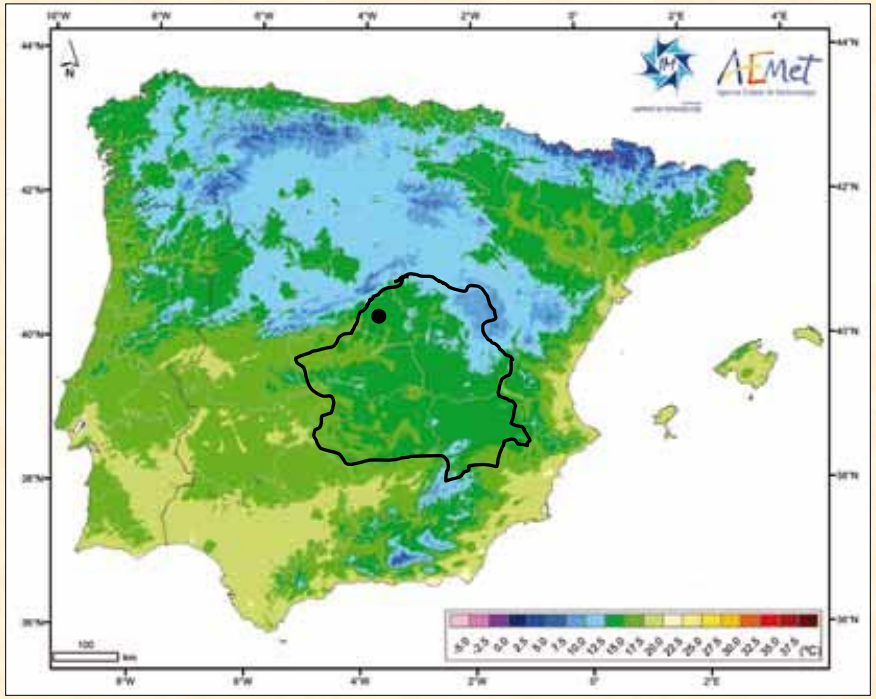
Design: variety and orchard site

Management: irrigation, N, pruning

Central Area of Spain: productivity and quality

Oil characteristics

- Early harvest to avoid frost
- Low Autumn temperatures (<17.5ºC): high oleic and flavour



Average temperature in October

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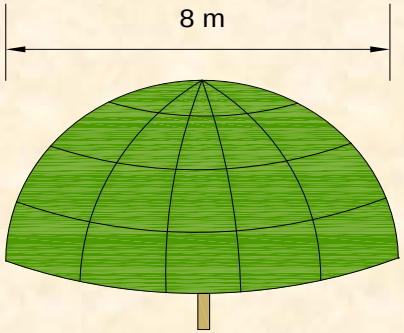
- Olive hedgerow design

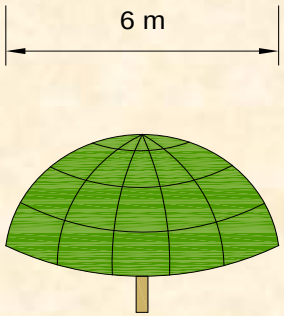
  Hedgerow layers – different fruits and oils
  Maximum productivity and quality

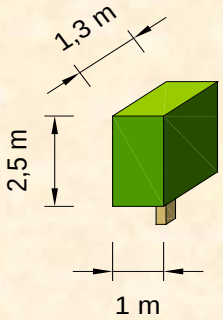
- Irrigation management of hedgerow olive orchard

Hedgerow or superintensive olive orchard

Spacing: 12 x 12 (69 trees/ha) SFE: 6.933 m^2/ha Canopy volume: 9.244 m^3/ha	Spacing: 8 x 7 (179 trees/ha) SFE: 7.588 m^2/ha Canopy volume:10.117 m^3/ha	Spacing: 4 x 1,3 (1923 trees/ha) **SFE: 14.999 m^2/ha** Canopy volume: 6.250 m^3/ha



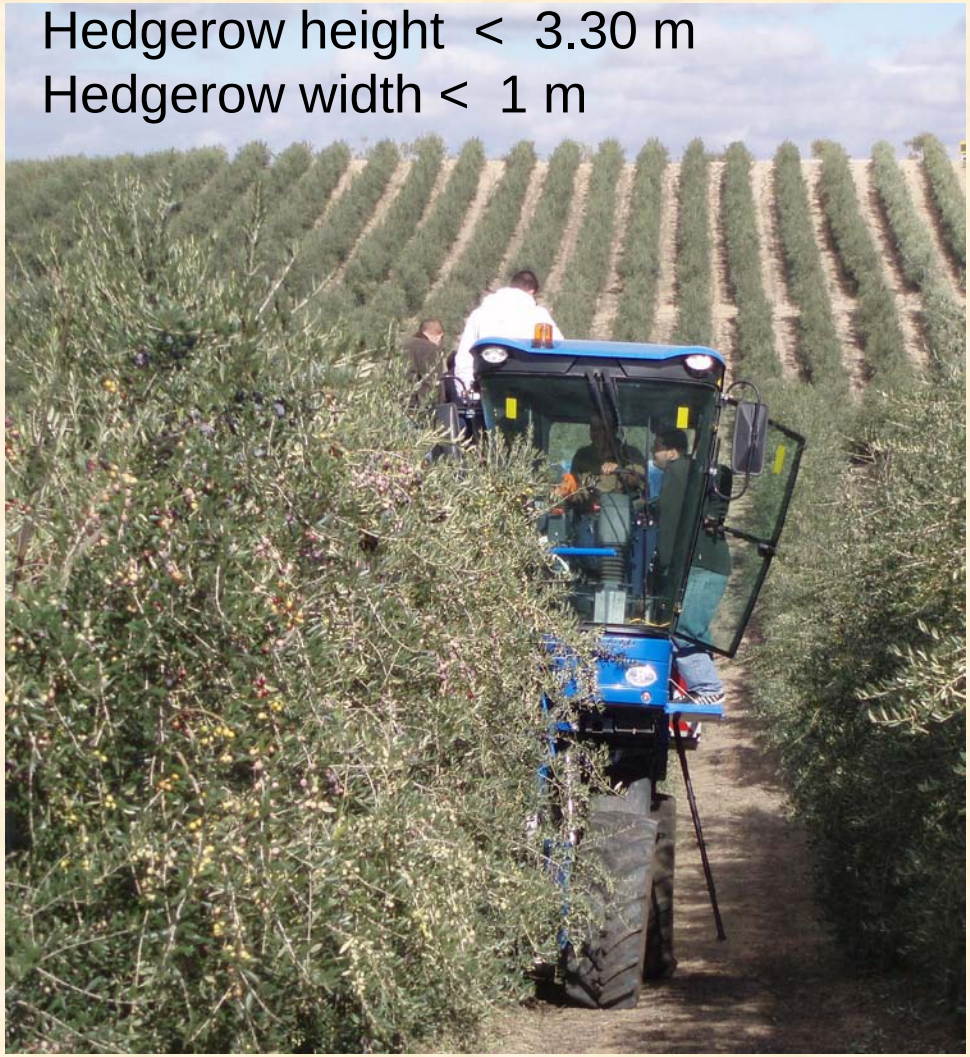




Hedgerow or superintensive olive orchard

Hedgerow for a harvester machine: modified grapeharvester

Hedgerow height < 3.30 m
Hedgerow width < 1 m



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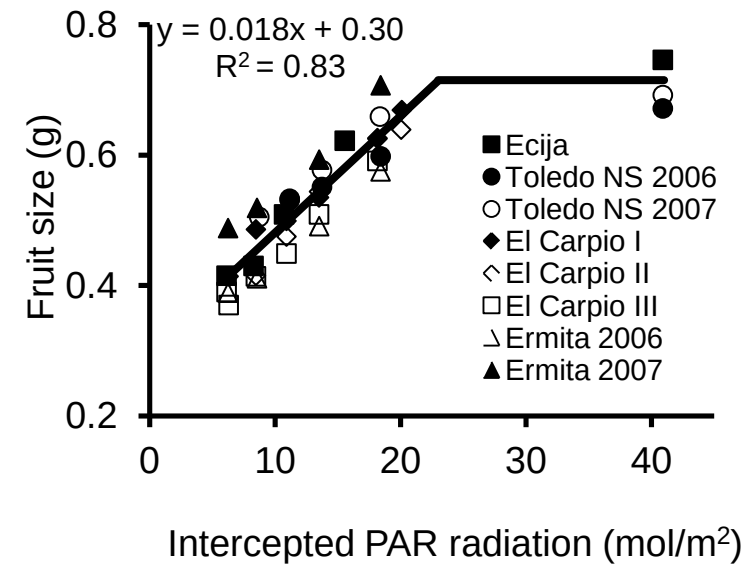
Olive hedgerow in Central Area of Spain
Which size?

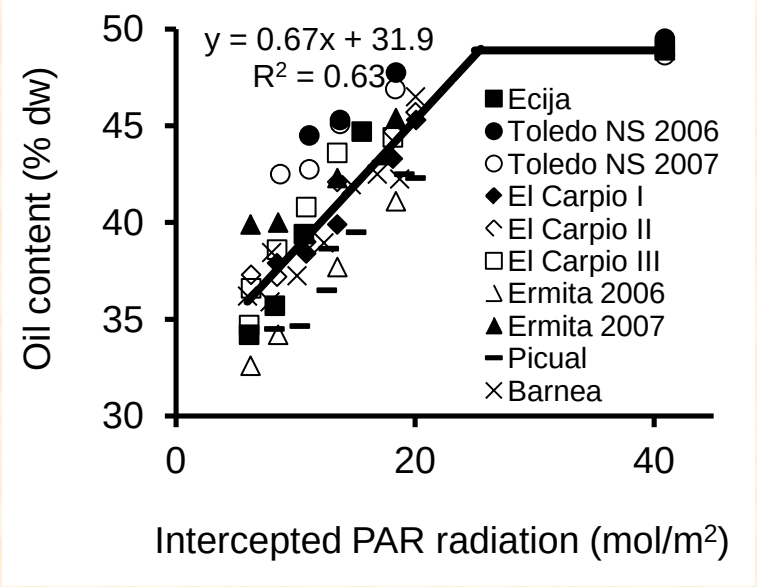
Pastor et al.. (2005)

Light determines productivity and quality

Hedgerow layers. Different fruits and oils

Light determines fruit characteristics





Connor (2006), Gómez del Campo et al. (2009), Connor et al. (2009)
Connor et al. (2011)

Hedgerow layers. Different fruits and oils

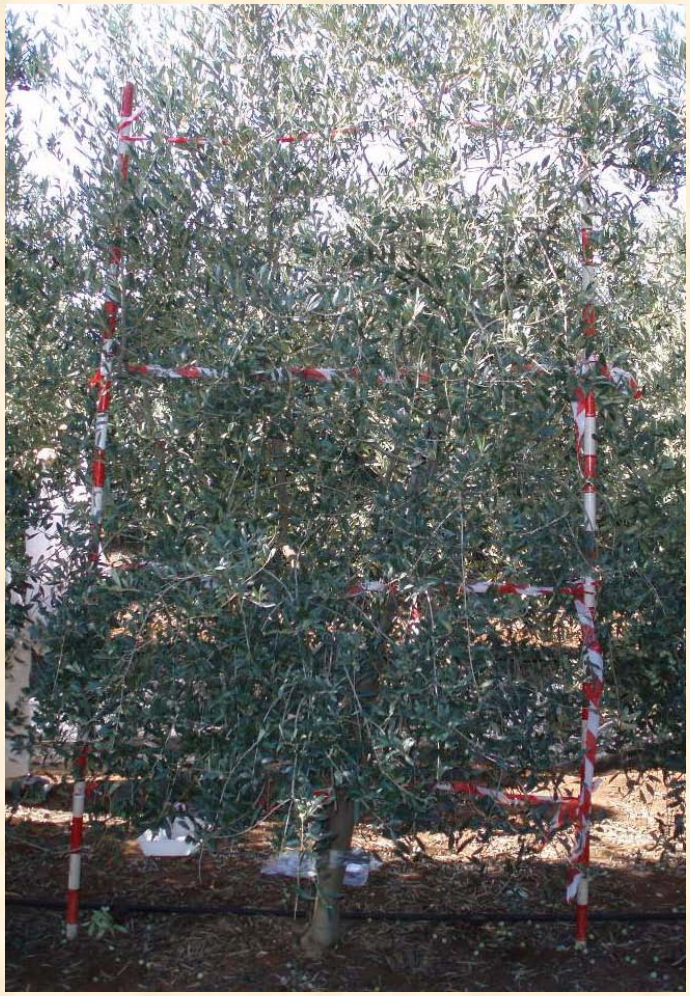
Light determines oil quality

2.2 m

1.6 m

1.0 m

0.4 m



Oil content

Size

Oxidative stability
Polyphenols

Linoleic

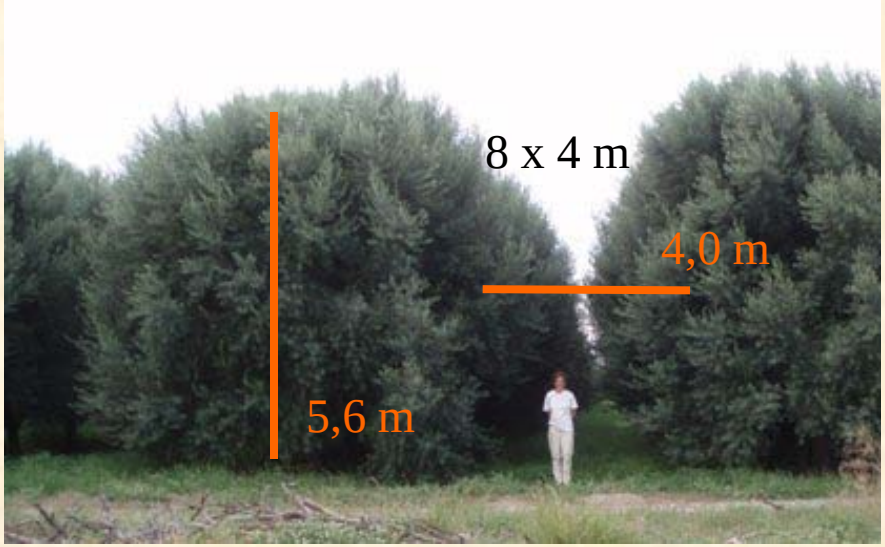
Oleic
Mono/poly
Unsat/Sat

Gómez del Campo and García (2011)

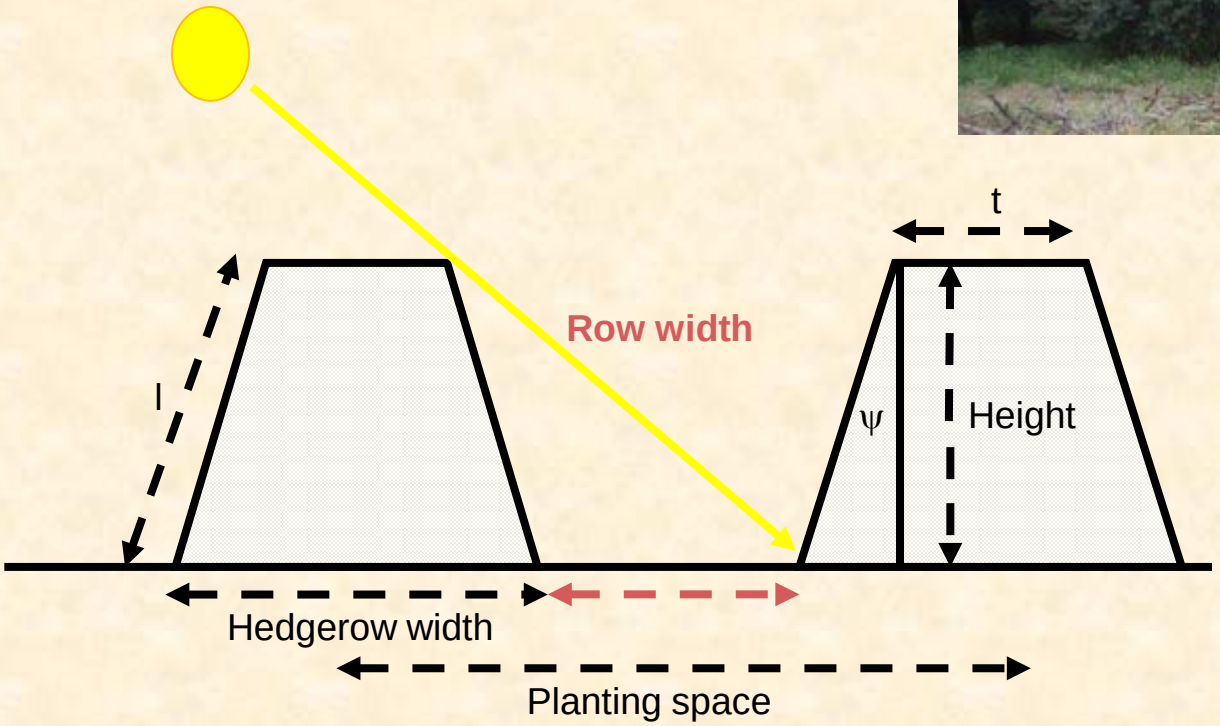
Hedgerow design

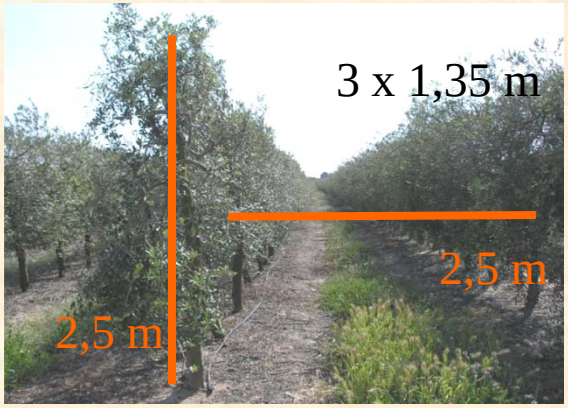
Which hedgerow size?

Optimal size: Maximum radiation interception and distribution for maximum production and profitability



Catamarca, Argentina





Tarragona, Spain

Hedgerow design

Maximum production

- Lower layers must be well illuminated
- Several combinations achieve maximum interception, but not same profitability

Maximum profitability

- **Narrow hedgerows**
- **Low hedgerows**

Different qualities

- Low illumination – high oleic
- High illumination – high polyphenols and stability

Irrigation management of hedgerow orchards

Defitic irrigation strategies in young orchard

(Centro de Olivicultura, 2004-2005)

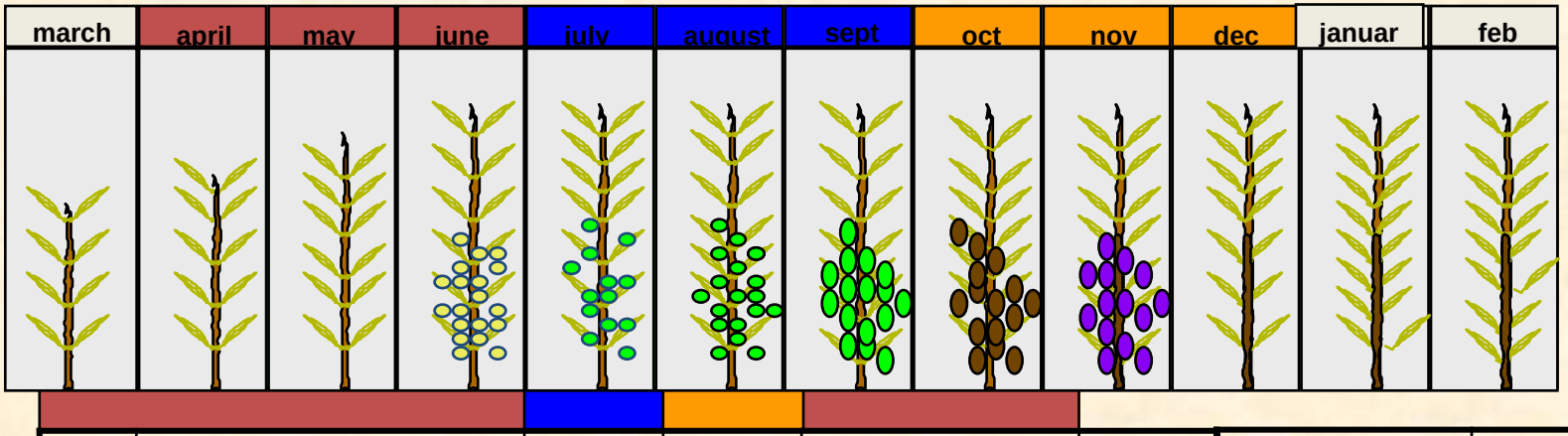
- Maximum growth was achieved by 68% deficit irrigation (36 and 76 mm, 2nd and 3rd season)
- The low water consumption of young olive trees was due to slow leaf area development

Gómez del Campo (2007) and

Gómez del Campo et al. (2008)

Irrigation management of hedgerow orchards

Summer deficit irrigation strategies (La Puebla de Montalbán, 2007-2009)



T1	100	100	100	100	100%
T2	100	100	30	100	-22%
T3	100	**30**	100	100	-16%
T4	100	50	**50**	100	-27%

	2007	**2008**	**2009**
P (mm)	415	365	186
ETo (mm)	1139	1219	1442
Riego (mm)	221	283	402

2008	**Fruit (kg/ha)**	**Oil (kg/ha)**	**Oil (%)**
T1	13.913	**2503 a**	41 b
T2	11.812	1933 b	38 c
T3	12.513	**2380 ab**	46 a
T4	12.012	2130 ab	41 b

Oil quality

-T3 higher oxidative stability

-T3 higher flavour

Gómez del Campo (2011)

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CHALLENGES OF HEDGEROW OLIVE ORCHARDS

- To determine optimal structure

  Radiation threshold values for fruit number and oil synthesis. Row orientations. Varieties

- To determine optimal management.

  Control of structure: varieties, irrigation and nutrition


Centro de Olivicultura de la Comunidad de Madrid, 2004
Thank you very much
Muchas gracias